CLAIMS

We claim:

1. A method for steam reforming of a hydrocarbon having the steps of flowing a mixture of steam and said hydrocarbon past a supported catalyst having a support and a catalyst metal thereon, and reacting said mixture at a temperature from about 600 °C to about 1000 °C forming at least one product; wherein the improvement comprises:

said support is a spinel support; and

said flowing is at a rate providing a residence time less than about 0.1 sec and obtaining said forming the same or greater compared to said forming at a longer residence time.

2. The method as recited in claim 1, wherein said mixture has a steam to carbon ratio less than 2.5, said improvement maintaining activity of said supported catalyst beyond 6 hours.

3. The method as recited in claim 1, wherein said spinel support controls acidity of said supported catalyst.

4. A method for steam reforming of a hydrocarbon having the steps of flowing a mixture of steam and said hydrocarbon having a steam to carbon ratio that is substantially stoichiometric past a supported catalyst having a support and a catalyst metal thereon, and reacting said mixture at a temperature from about 600 °C to about 1000 °C forming at least one product and degrading catalytic activity of said supported catalyst; wherein the improvement comprises:

said support is a spinel support; and

said flowing is at a rate providing a residence time less than about 0.1 sec and maintaining activity of said supported catalyst for said steam to carbon ratio less than 2.5.

5. The method as recited in claim 4, wherein said support is spinel that controls acidity of said supported catalyst.

6. The method as recited in claim 4, wherein said steam to carbon ratio is greater than about 0.9 and less than about 2.5.

7. The method as recited in claim 4, wherein said supported catalyst is on a porous substrate.

8. A catalyst structure for steam reforming of a hydrocarbon, comprising:

(a) a first porous structure with a first pore surface area and a first pore size of at least about 0.1 μm;

(b) a buffer layer upon said first pore surface area;

(c) a porous interfacial layer that is a spinel with a second pore surface area and a second pore size less than said first pore size, said porous interfacial layer having a thickness less than 4 mm placed upon said buffer layer;

(d) a steam reforming catalyst selected from the group consisting of rhodium, iridium, nickel, palladium, platinum, carbide of group IVb and combinations thereof placed upon said second pore surface area.

9. The catalyst structure as recited in claim 8, wherein said carbide is selected from the group of tungsten carbide, molybdenum carbide and combinations thereof.